

ABSTRACT

A semiconductor device includes: a substrate; a buffer layer including GaN formed on the substrate, wherein: surfaces of the buffer layer are c facets of Ga atoms; a channel layer including GaN or InGaN formed on the buffer layer, wherein: surfaces of the channel layer are c facets of Ga or In atoms; an electron donor layer including AlGaN formed on the channel layer, wherein: surfaces of the electron donor layer are c facets of Al or Ga atoms; a source electrode and a drain electrode formed on the electron donor layer; a cap layer including GaN or InGaAlN formed between the source electrode and the drain electrode, wherein: surfaces of the cap layer are c facets of Ga or In atoms and at least a portion of the cap layer is in contact with the electron donor layer; and a gate electrode formed at least a portion of which is in contact with the cap layer.